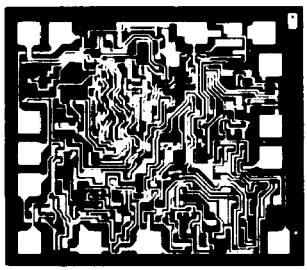
ULN-3809A PHASE-LOCKED LOOP STEREO DECODER

FEATURES

- Unity Voltage Gain
- I^2L and Ion Implant Technology
- Wide Dynamic Range
- Low Distortion
- Excellent Channel Separation
- No Tuning Coils
- Automatic Stereo/Mono Switching
- Stereo Indicator Lamp Driver
- Direct Replacement for MC1309
- 14-Pin Dual In-Line Plastic Package



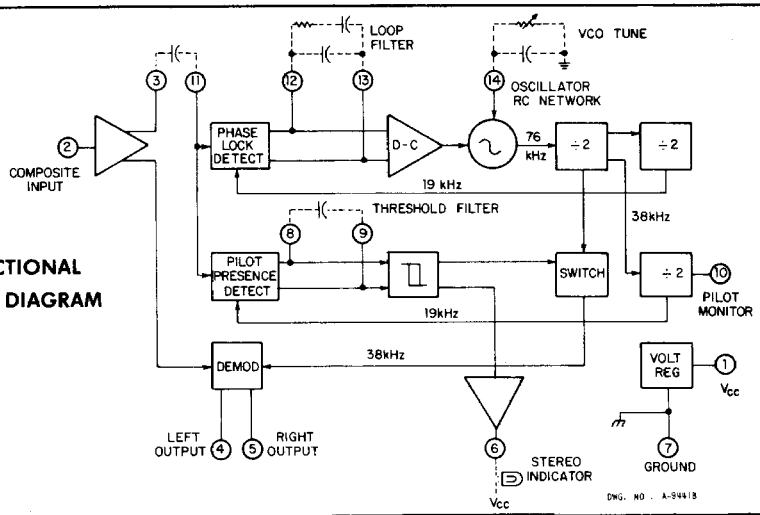
SPRAGUE Type ULN-3809A phase-locked loop decoder demodulates standard composite F-M stereo input signals within the range of 0.25 to 1.7 Vpp without the use of tuning coils.

Integrated circuit design allows tuning with a single resistive adjustment. The decoder automatically switches between stereo and monaural operation by detection and evaluation of the 19-kHz pilot carrier signal.

Type ULN-3809A exhibits 35 dB suppression of the 19-kHz pilot and 45 dB rejection of the regenerated 38-kHz subcarrier at demodulator output terminals. Stereo channel separation is typically 47 dB. With a composite input signal of 850 mV, total harmonic distortion for the unit is typically 0.06%.

Type ULN-3809A is designed to work within a range of supply voltages from 4.5 to 16 V.

FUNCTIONAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC} . . . . . 16 V
Nominal Lamp Current, I_{LAMP} . . . . . 50 mA
Package Power Dissipation, P_D . . . . . 670 mW*
Operating Temperature Range, T_A . . . . . −20°C to +85°C
Storage, Temperature Range, T_S . . . . . −65°C to +150°C

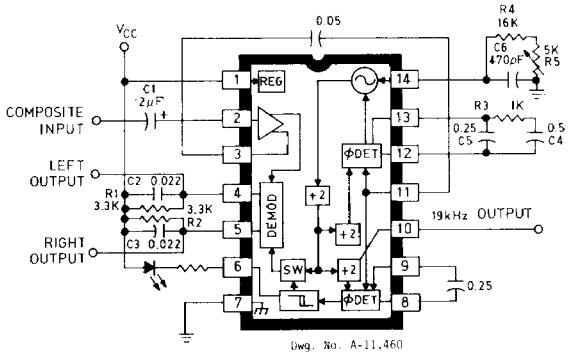
*Derate at the rate of 8.3 mW/C above T_A = +70°C.

ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{CC} = 9.0 V, V_{in} = 1.7 Vpp, f_m = 1.0 kHz (L or R only), Pilot Level = 10% unless otherwise specified

Characteristic	Test Conditions	Limits			Units
		Min.	Typ.	Max.	
Max. Standard Composite Input Signal	V_{CC} = 6.0 V, 0.5% THD	0.85	1.7	—	Vpp
	V_{CC} = 9.0 V, 0.5% THD	1.7	2.1	—	Vpp
Max. Monaural Input Signal	V_{CC} = 6.0 V, 1.0% THD	0.85	1.7	—	Vpp
	V_{CC} = 9.0 V, 1.0% THD	1.7	2.2	—	Vpp
Input Impedance		15	30	—	kΩ
Stereo Channel Separation	f = 100 Hz	—	45	—	dB
	f = 1.0 kHz	30	47	—	dB
	f = 10 kHz	—	40	—	dB
Monaural Gain		0.6	0.9	—	V/V
Channel Balance		—	0	1.0	dB
Total Harmonic Distortion	Stereo, V_{in} = 850 mVpp	—	0.06	—	%
	Mono, V_{in} = 850 mVpp	—	0.08	—	%
Ultrasonic Frequency Rejection	19 kHz	—	35	—	dB
	38 kHz	—	45	—	dB
SCA Rejection		—	75	—	dB
Stereo Switch Level	Lamp ON	—	9.0	12	mV
	Lamp OFF	2.0	4.5	—	mV
Mono/Stereo Switch Transient	No Lamp	—	0	—	mV
Capture Range	Pilot = 60 mVrms	—	7.0	—	%
Supply Current		—	11	—	mA

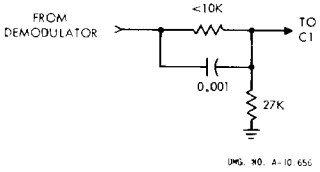
NOTE: THD and channel separation are measured after a bandpass filter (200 Hz to 10 kHz).

APPLICATIONS INFORMATION

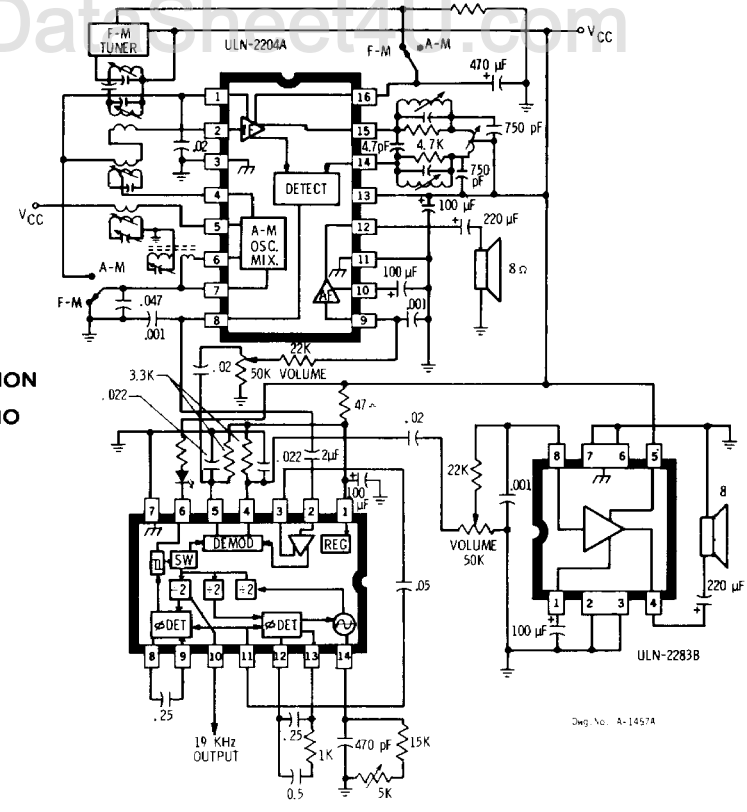


TEST CIRCUIT AND TYPICAL APPLICATION

1. If relaxed performance is acceptable, the external circuit can be simplified by decreasing the value of C_1 (reduces separation at low frequencies), decreasing the values of C_4 and R_3 while eliminating C_5, and decreasing the value of C_6 while increasing the values of R_4 and R_5 (increases capture-range and beat-note distortion).
2. Typical I-F amplifier frequency response restricts channel separation to about 32 dB. This restriction can be counteracted by the network shown below. Exact circuit values will be determined by the I-F amplifier design.



3. To manually disable the stereo decoder, ground pin 8 and connect pin 14 to ground through a resistance of 3.3 kΩ.
4. Capacitor C_6 should be temperature-stable (NPO).



MINIMUM-COST APPLICATION IN A-M/F-M STEREO RADIO